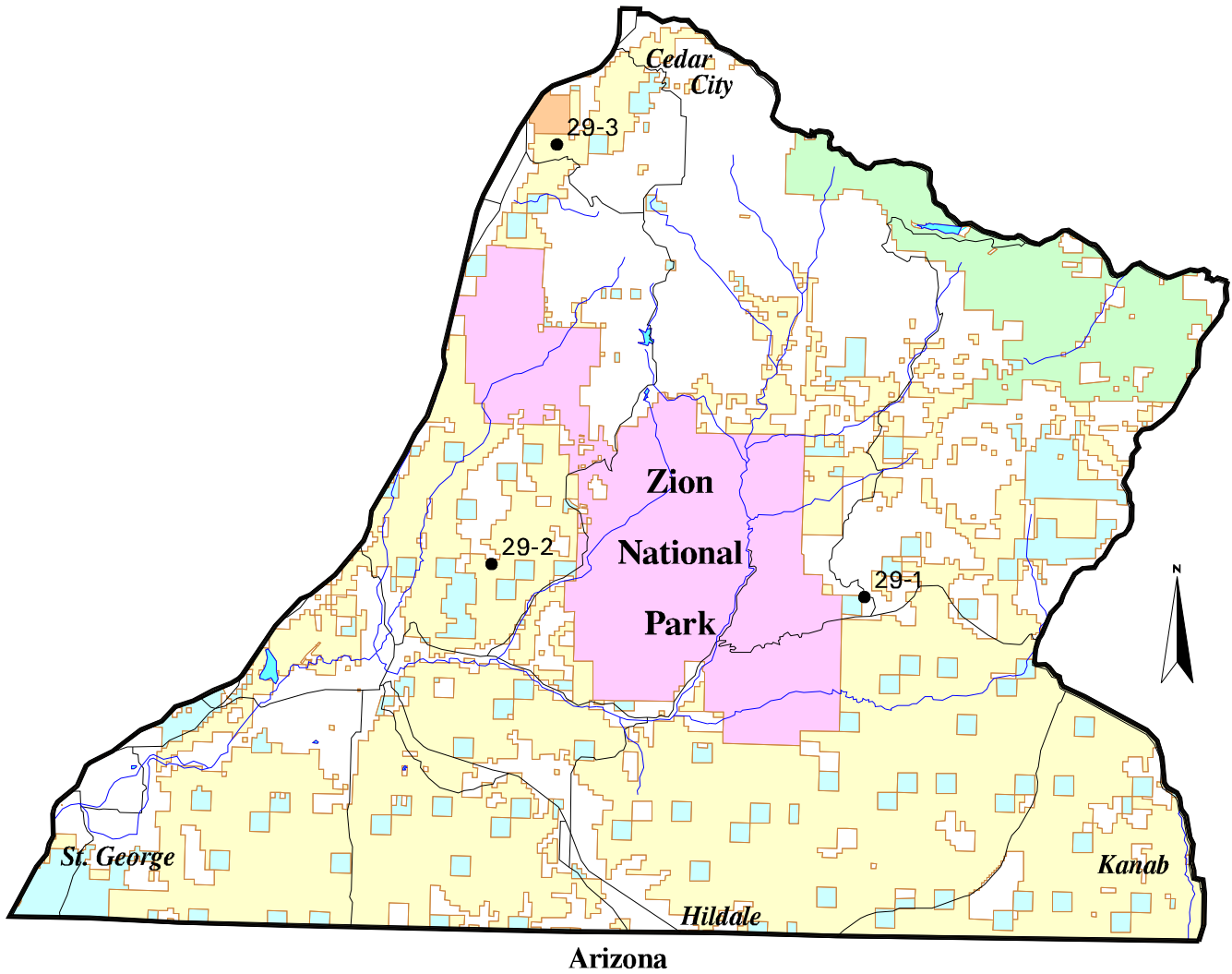












# Management Unit 29

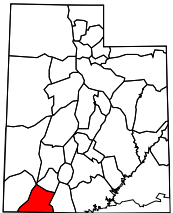


Map Scale 1:570,240 (1" = 9 miles)

## Legend

- |   |   |
|---|---|
|  Forest Service              |  National Park     |
|  BLM                         |  Water Body        |
|  State of Utah               |  Transect Location |
|  Native American Reservation |  Road              |
|  Private Land                |  Perennial Stream  |

## Unit Location



## WILDLIFE MANAGEMENT UNIT 29 (51) - ZION

### Boundary Description

**Iron, Kane and Washington counties** - Boundary begins at Interstate 15 and the Utah-Arizona state line; then north on I-15 to Highway SR-14; then east on SR-14 to Highway US-89; then south on US-89 to Highway US-89A; then south on US-89A to the Utah-Arizona state line; then west on this state line to I-15 and beginning point.

The Zion unit is relatively large, yet there are few trend studies located within the unit. There is an estimated 301,431 acres of deer summer range and 333,914 acres of winter range on the unit. Most of the summer range is found in the northern part of the unit, which includes the southern end of the Markagunt Plateau. Unlike the majority of the wildlife management units in the state, most of the summer range (59%) in the Zion unit occurs on private land with increased summer home development becoming more of a management problem. Of the remaining summer range, 21% is administered by the Forest Service and another 12% occurs within Zion National Park. Winter range predominately occurs on BLM land (54%), with an additional 20% in Zion National Park, and 18% private.

### Herd Unit Management Objectives

Current population management objectives are to maintain a target modeled winter herd population of 7,000 deer. Population density was estimated at 5,000 in 1996. A total of 1,170 bucks are to be harvested annually. The herd composition is to be managed at 15 bucks/100 does post season, with 30% of those bucks being 3 point or better. The buck-doe ratio for 1996-97 was only 7 bucks/100 does.

Peak harvests were reached in the mid 1960's with over 1,700 bucks harvested in 1965 and 1966. Since then, harvests have shown a downward trend, the lowest harvest was in 1979 when less than 400 bucks were harvested. Harvests quickly rebounded in 1986 and 1989. Between 1990 and 1995, an average of 1,091 bucks were harvested from the unit. Fawn/100 doe ratios have been good and have averaged 72 between 1991-92 and 1995-96.

### Study Site Description

Only one key area was selected for study on this Unit in 1987. It was located at Wilson Ranch (now the Clear Creek Ranch). This study samples a Wyoming big sagebrush flat on private land which is located just east of Zion National Park boundary, north of Highway 9. This site was reread in 1992 and 1998. In 1998, two additional trend study sites were established, one at Smith Mesa and the other at North Hills. Both occur on the west side of the unit.

### Trend Study 29-1-98

Study site name: Wilson Ranch .

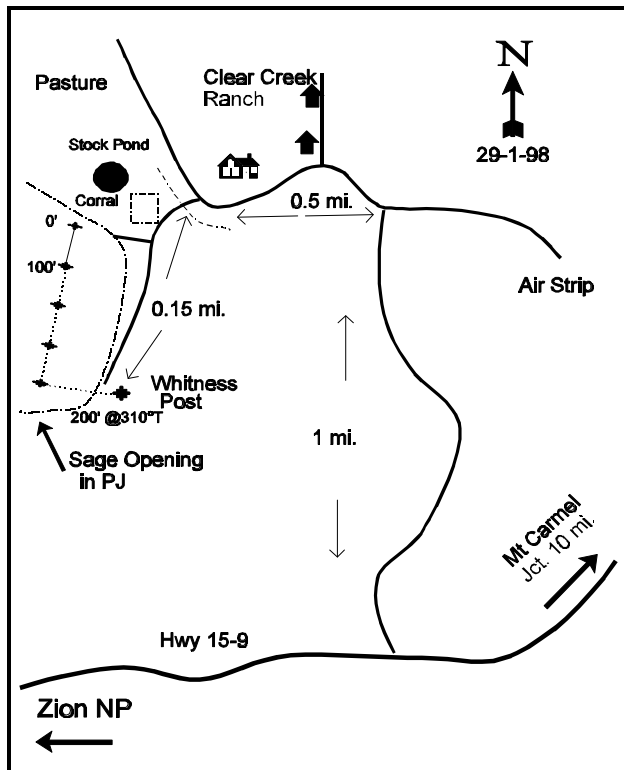
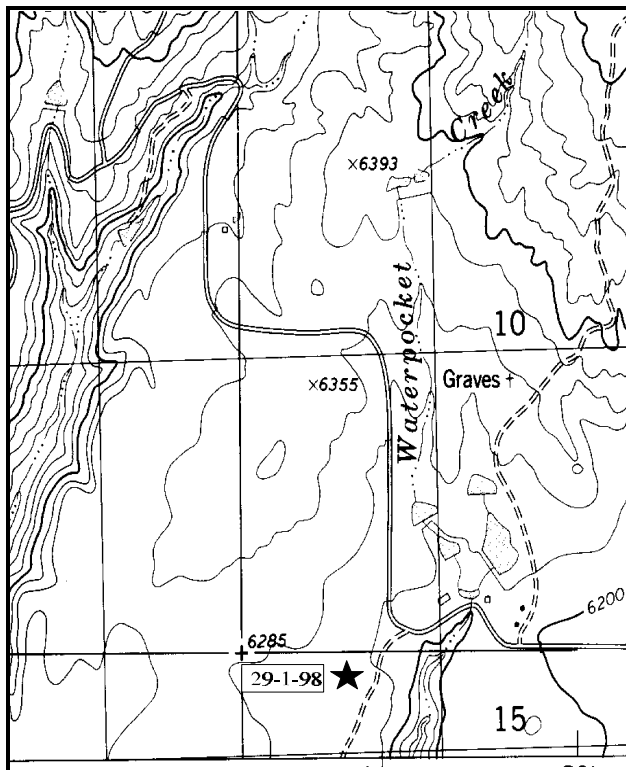
Range type: Big Sagebrush .

Compass bearing: frequency baseline 180 degrees.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft).

### LOCATION DESCRIPTION

From Mt. Carmel Junction, travel west on SR-9 for about 10.8 miles to a road going towards the Clear Creek Ranch and Zion Narrows. Go 1.0 mile north on this road to an intersection by the airstrip. Turn left, go past the Clear Creek Ranch houses and barn for 0.5 miles to where the main road curves to the right around the ranch - take a small fork to the left here. Go through a gate and to a corral. Bear left into the P-J at a fork just past the corral, go 0.15 miles and stop by a witness post. Walk northwest about 200 feet into the P-J to a sagebrush opening and the end of the baseline. The 0-foot stake is 400 feet north, and the 2' fencepost is marked by browse tag #7159.



Map Name: Clear Creek Mountain

Diagrammatic Sketch

Township 41S , Range 9W , Section 15

UTM 4124150.795 N, 336644.852 E

## DISCUSSION

### Trend Study No. 29-1

The Wilson Ranch trend study samples an area of deer winter range located on the Kolob Terrace. The land was part of the privately owned Wilson Ranch. Ownership appears to have changed since 1987. During the 1992 reading, the ranch was called the Cedar Creek Ranch, and in 1998 it was called the Clear Creek Ranch. The study samples a small opening of Wyoming big sagebrush surrounded by pinyon-juniper with scattered oak clones. It has a slight northern aspect with a gentle slope of approximately 2% and an elevation of 6,200 feet. Cattle grazing, which occurred during the 1987 reading, appeared to have been discontinued in 1992. However, cattle use was noted again in 1998. Pellet group data from 1998 estimate light cattle use at 11 days use/acre. Deer use appears to be very high with an estimated 111 days use/acre. Most of the deer pellet groups were several months old, but some fresh tracks were found on the site. Pellet groups appeared to be concentrated in the sagebrush clearing, with dramatically less frequent sign outside the sagebrush opening. About 1/4 of a mile to the east are irrigated hay fields, which deer may be using during the summer. Quadrat frequency of deer pellet groups have increased since 1992, indicating a higher level of use.

Soil on the site is relatively shallow with an effective rooting depth (see methods) estimated at 15 inches. At that depth, the soil becomes very compacted and there may be a hardpan, or some kind of other restrictive layer present. Texture is a sandy loam with a neutral pH (6.8). Rock and pavement are not common on the surface or within the soil profile. The red, sandy loam soil is highly erodible. Rills are common across the site, leading to small gullies in the pinyon-juniper north of the baseline. The effects of erosion are minimized by the levelness of the terrain.

The dominant shrub in the opening is Wyoming big sagebrush which had an estimated density of 2,466 plants/acre in 1987. The age structure of the population at that time appeared stable, with 57% of the plants classified as mature, 24% decadent, and 19% young. Seedlings numbered 333/acre. Forty-six percent of the sagebrush were heavily hedged. Wyoming big sagebrush density increased to an estimated 9,820 plants/acre by 1992. Some of this increase is due to the much larger sample size taken during that year, but the population definitely increased with large numbers of young plants sampled at that time (5,340 plants/acre). Percent decadency remained similar, while the proportion of shrubs displaying heavy hedging declined to 9%. Density declined 59% by 1998 from 9,820 to 4,060 plants/acre. This decline is mostly due to a decline in density of young plants (5,340 to 720 plants/acre). Dead plants, first included in the 1998 surveys, were abundant with 33% of the decadent plants classified as dying. Utilization is similar to 1992 levels, but with more moderate use. Percent decadency has increased slightly from 21% in 1992 to 34% by 1998. Young plants are still common and represent 18% of the population.

Other important browse species on the site consist of Utah serviceberry, black sagebrush, and small numbers of squaw-apple. Black sagebrush displayed extremely heavy use in 1987, but more moderate use in 1992 and 1998. The small population of squaw-apple was all heavily hedged in 1987 and 1998. It likely receives dual use from cows and deer.

Broom snakeweed was the most numerous shrub on the site with an estimated density of 2,933 plants/acre in 1987, increasing to 13,080 by 1992. Density declined to 8,680 plants/acre by 1998. Biotic potential is still high at 17%. The proportion of young plants has increased from 18% in 1987 to 34% in 1998. Pinyon and juniper trees are encroaching into the clearing. Point quarter data from 1998 estimate 32 Utah juniper and 29 pinyon pine trees/acre. Average basal diameter is 6.7 inches for juniper and 3.6 inches for pinyon.

The herbaceous understory is poor and lacking perennial species. Annual cheatgrass dominates the understory. It provided 32% of the grass cover in 1992, increasing to 69% by 1998. Cheatgrass cover also increased from 1% to 9% during the same period. The second most abundant grass is another annual, sixweeks fescue. Four species of perennial grass include the following: Indian ricegrass, mutton bluegrass,

sand dropseed, and bottlebrush squirreltail are found on the site, yet none provide more than 1% cover. Most of the grass is found in the protection of shrubs. Forbs are diverse, although they provide very little forage. The most common species is the annual bur buttercup.

#### 1987 APPARENT TREND ASSESSMENT

Over half of the ground surface is exposed soil due to the lack of vegetation cover between the individual sagebrush. There are a few patches of cryptogams. Litter cover is estimated at 43%, making a total ground cover of 47%. A healthy population of Wyoming big sagebrush represents the key browse species for this site. Age class analysis indicates a stable population. Less abundant shrubs consisting of squaw-apple and bitterbrush are heavily hedged. Broom snakeweed is the most numerous browse which appears to be increasing. Herbaceous species are fairly diverse, yet not very abundant.

#### 1992 TREND ASSESSMENT

Most of the herbaceous vegetation occurs under shrub and tree canopies leaving the interspaces prone to erosion. Bare ground estimates have declined slightly from 53% to 43%, but litter cover also declined from 43% to 31%. Trend is considered stable, although it is in very poor condition. Trend for browse is considered up with increased densities of Wyoming big sagebrush. Utilization is lighter and reproduction improved. Herbaceous plants, growing mostly under the shrub and tree canopies, are diverse and not abundant, producing little usable forage. Sum nested frequencies for perennial grasses remained stable, while those for forbs increased, indicating a slightly upward trend.

##### TREND ASSESSMENT

soil - stable, but in very poor condition

browse - up

herbaceous understory - up slightly

#### 1998 TREND ASSESSMENT

Trend for soil appears stable with similar amounts of bare ground compared to 1992. Conditions are still poor however. Trend is down for the key species, Wyoming big sagebrush. Density has declined by 59%, use is heavier, percent decadence has increased from 21% to 34%, and a larger proportion of decadent plants appear to be dying. Trend for the herbaceous understory is stable for perennial grasses, but down significantly for forbs, although forbs make up 19% of the herbaceous understory cover. The annual, cheatgrass, has increased significantly in nested frequency since 1992. It currently provides 69% of the grass cover and 55% of the total herbaceous cover. Another annual, sixweeks fescue, has also increased significantly in nested frequency and is now the second most abundant grass on the site providing an additional 13% of the grass cover. Perennial grasses are scarce and found growing exclusively under the protection of shrubs. Forbs are very diverse but annuals dominate the composition. Overall, trend is considered down and in poor condition.

##### TREND ASSESSMENT

soil - stable, but in very poor condition

browse - down

herbaceous understory - down and dominated by annuals

HERBACEOUS TRENDS --  
Herd unit 29 , Study no: 1

| T<br>y<br>p<br>e            | Species                     | Nested Frequency |                  |                  | Quadrat Frequency |     |     | Average<br>Cover % |       |
|-----------------------------|-----------------------------|------------------|------------------|------------------|-------------------|-----|-----|--------------------|-------|
|                             |                             | '87              | '92              | '98              | '87               | '92 | '98 | '92                | '98   |
| G                           | Bromus tectorum (a)         | -                | <sub>a</sub> 98  | <sub>b</sub> 253 | -                 | 40  | 83  | 1.02               | 9.04  |
| G                           | Oryzopsis hymenoides        | 17               | 30               | 33               | 9                 | 15  | 16  | .54                | .63   |
| G                           | Poa fendleriana             | 29               | 33               | 25               | 12                | 15  | 12  | .47                | .69   |
| G                           | Sitanion hystrix            | <sub>b</sub> 75  | <sub>a</sub> 41  | <sub>ab</sub> 46 | 31                | 18  | 26  | .53                | .38   |
| G                           | Sporobolus cryptandrus      | 21               | 40               | 35               | 10                | 19  | 17  | .53                | .74   |
| G                           | Stipa comata                | -                | -                | 2                | -                 | -   | 1   | -                  | .00   |
| G                           | Vulpia octoflora (a)        | -                | <sub>a</sub> 17  | <sub>b</sub> 72  | -                 | 8   | 28  | .06                | 1.68  |
| Total for Annual Grasses    |                             | 0                | 115              | 325              | 0                 | 48  | 111 | 1.09               | 10.73 |
| Total for Perennial Grasses |                             | 142              | 144              | 141              | 62                | 67  | 72  | 2.09               | 2.46  |
| Total for Grasses           |                             | 142              | 259              | 466              | 62                | 115 | 183 | 3.18               | 13.19 |
| F                           | Antennaria rosea            | -                | -                | 1                | -                 | -   | 1   | -                  | .03   |
| F                           | Arabis spp.                 | <sub>a</sub> -   | <sub>b</sub> 7   | <sub>b</sub> 9   | -                 | 5   | 5   | .02                | .07   |
| F                           | Astragalus piutensis        | 3                | -                | -                | 2                 | -   | -   | -                  | -     |
| F                           | Calochortus nuttallii       | <sub>a</sub> -   | <sub>b</sub> 12  | <sub>ab</sub> 3  | -                 | 5   | 1   | .02                | .01   |
| F                           | Chenopodium spp. (a)        | -                | <sub>b</sub> 6   | <sub>a</sub> -   | -                 | 4   | -   | .02                | -     |
| F                           | Cymopterus spp.             | -                | 3                | -                | -                 | 1   | -   | .00                | -     |
| F                           | Dalea searlsiae             | 2                | -                | 1                | 2                 | -   | 1   | .04                | .03   |
| F                           | Draba spp. (a)              | -                | <sub>a</sub> -   | <sub>b</sub> 20  | -                 | -   | 10  | -                  | .05   |
| F                           | Epilobium brachycarpum (a)  | -                | 27               | 23               | -                 | 10  | 9   | .10                | .04   |
| F                           | Erigeron divergens          | 59               | 62               | 66               | 28                | 25  | 31  | .22                | .65   |
| F                           | Ipomopsis aggregata         | 4                | -                | -                | 2                 | -   | -   | -                  | -     |
| F                           | Lomatium spp.               | -                | 2                | 1                | -                 | 1   | 1   | .00                | .03   |
| F                           | Lotus utahensis             | -                | -                | 4                | -                 | -   | 2   | -                  | .03   |
| F                           | Lupinus argenteus           | -                | -                | 3                | -                 | -   | 1   | -                  | .03   |
| F                           | Microsteris gracilis (a)    | -                | <sub>b</sub> 146 | <sub>a</sub> 73  | -                 | 58  | 33  | .36                | .36   |
| F                           | Orobancha corymbosa         | -                | 4                | -                | -                 | 2   | -   | .01                | -     |
| F                           | Penstemon linarioides       | <sub>b</sub> 11  | <sub>a</sub> -   | <sub>a</sub> -   | 6                 | -   | -   | -                  | -     |
| F                           | Phlox longifolia            | <sub>a</sub> -   | <sub>ab</sub> 7  | <sub>b</sub> 7   | -                 | 3   | 4   | .02                | .02   |
| F                           | Polygonum douglasii (a)     | -                | <sub>b</sub> 135 | <sub>a</sub> 52  | -                 | 57  | 22  | .43                | .18   |
| F                           | Portulaca oleracea          | 4                | -                | -                | 2                 | -   | -   | -                  | -     |
| F                           | Ranunculus testiculatus (a) | -                | <sub>a</sub> 65  | <sub>b</sub> 159 | -                 | 25  | 55  | .20                | 1.44  |
| F                           | Sanguisorba minor           | -                | -                | 3                | -                 | -   | 1   | -                  | .03   |
| F                           | Senecio multilobatus        | -                | 3                | 2                | -                 | 1   | 2   | .00                | .01   |
| F                           | Sphaeralcea parvifolia      | 1                | 10               | 3                | 1                 | 6   | 2   | .13                | .01   |
| F                           | Tragopogon dubius           | -                | -                | 1                | -                 | -   | 1   | -                  | .03   |
| F                           | Trifolium spp.              | -                | 2                | 5                | -                 | 1   | 2   | .00                | .03   |
| F                           | Verbena bracteata           | -                | -                | -                | -                 | -   | -   | .00                | -     |
| F                           | Viguiera multiflora         | -                | 3                | 3                | -                 | 1   | 1   | .00                | .00   |

| Type | Species                   | Nested Frequency |     |     | Quadrat Frequency |     |     | Average Cover % |      |
|------|---------------------------|------------------|-----|-----|-------------------|-----|-----|-----------------|------|
|      |                           | '87              | '92 | '98 | '87               | '92 | '98 | '92             | '98  |
|      | Total for Annual Forbs    | 0                | 244 | 327 | 0                 | 97  | 129 | 0.68            | 2.09 |
|      | Total for Perennial Forbs | 84               | 250 | 112 | 43                | 108 | 56  | 0.95            | 1.03 |
|      | Total for Forbs           | 84               | 494 | 439 | 43                | 205 | 185 | 1.63            | 3.12 |

Values with different subscript letters are significantly different at  $\alpha = 0.10$

#### BROWSE TRENDS --

Herd unit 29 , Study no: 1

| Type | Species                           | Strip Frequency |     | Average Cover % |       |
|------|-----------------------------------|-----------------|-----|-----------------|-------|
|      |                                   | '92             | '98 | '92             | '98   |
| B    | Amelanchier utahensis             | 6               | 5   | 3.70            | 4.19  |
| B    | Artemisia nova                    | 14              | 4   | .30             | .00   |
| B    | Artemisia tridentata wyomingensis | 82              | 73  | 13.49           | 7.36  |
| B    | Chrysothamnus depressus           | 1               | 0   | -               | -     |
| B    | Gutierrezia sarothrae             | 76              | 79  | 2.20            | 4.53  |
| B    | Juniperus osteosperma             | 5               | 4   | 5.99            | 7.11  |
| B    | Opuntia spp.                      | 2               | 3   | .00             | .00   |
| B    | Peraphyllum ramosissimum          | 1               | 1   | .00             | .03   |
| B    | Pinus edulis                      | 2               | 5   | -               | .03   |
| B    | Purshia tridentata                | 0               | 0   | -               | -     |
| B    | Quercus gambelii                  | 2               | 2   | .85             | .78   |
| B    | Ribes cereum cereum               | 0               | 1   | -               | -     |
|      | Total for Browse                  | 191             | 177 | 26.55           | 24.06 |

#### CANOPY COVER --

Herd unit 29 , Study no: 1

| Species               | Percent Cover '98 |
|-----------------------|-------------------|
| Juniperus osteosperma | 11                |
| Quercus gambelii      | 1                 |

#### BASIC COVER --

Herd unit 29 , Study no: 1

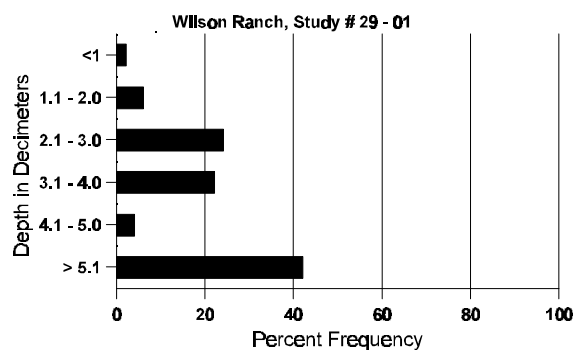
| Cover Type  | Nested Frequency |     | Average Cover % |       |       |
|-------------|------------------|-----|-----------------|-------|-------|
|             | '92              | '98 | '87             | '92   | '98   |
| Vegetation  | 319              | 334 | 1.00            | 30.22 | 36.04 |
| Rock        | 158              | 90  | 2.25            | 2.61  | 2.96  |
| Pavement    | 35               | 174 | 0               | .06   | 1.72  |
| Litter      | 309              | 380 | 43.00           | 31.02 | 41.09 |
| Cryptogams  | 79               | 72  | .50             | 1.25  | 1.62  |
| Bare Ground | 297              | 298 | 53.25           | 43.19 | 44.02 |

# SOIL ANALYSIS DATA --

Herd Unit 29, Study # 01, Study Name: Wilson Ranch

| Effective rooting depth (inches) | Temp °F (depth) | pH  | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|----------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 15.1                             | 63.6<br>(15.1)  | 6.8 | 56.7  | 23.4  | 19.8  | 1.7 | 9.9   | 80.0  | .4   |

## Stoniness Index



## PELLET GROUP FREQUENCY --

Herd unit 29 , Study no: 1

| Type   | Quadrat Frequency |     |
|--------|-------------------|-----|
|        | '92               | '98 |
| Rabbit | 27                | 20  |
| Deer   | 42                | 76  |
| Cattle | -                 | 3   |



## BROWSE CHARACTERISTICS --

Herd unit 29 , Study no: 1

| A<br>G<br>E                                    | Y<br>R | Form Class (No. of Plants) |   |   |                  |    |   |                   |   |   | Vigor Class    |     |      |      | Plants<br>Per Acre | Average<br>(inches)<br>Ht. Cr. |    | Total |
|--|--------|----------------------------|---|---|------------------|----|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
|  |        | 1                          | 2 | 3 | 4                | 5  | 6 | 7                 | 8 | 9 | 1              | 2   | 3    | 4    |                    |                                |    |       |
| Amelanchier utahensis                          |        |                            |   |   |                  |    |   |                   |   |   |                |     |      |      |                    |                                |    |       |
| S  | 87     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
|  | 92     | 1                          | - | - | -                | -  | - | 3                 | - | - | 4              | -   | -    | -    | 80                 |                                | 4  |       |
|  | 98     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
| Y  | 87     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
|  | 92     | -                          | - | - | -                | 15 | - | 27                | - | - | 42             | -   | -    | -    | 840                |                                | 42 |       |
|  | 98     | 5                          | - | - | 9                | -  | - | -                 | - | - | 14             | -   | -    | -    | 280                |                                | 14 |       |
| M  | 87     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  | -                              | 0  |       |
|  | 92     | -                          | 1 | - | -                | 3  | - | 4                 | - | - | 8              | -   | -    | -    | 160                | -                              | 8  |       |
|  | 98     | 24                         | 1 | - | 35               | -  | - | -                 | - | - | 60             | -   | -    | -    | 1200               | 80 72                          | 60 |       |
| D  | 87     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
|  | 92     | -                          | - | 1 | 1                | -  | - | -                 | - | - | 2              | -   | -    | -    | 40                 |                                | 2  |       |
|  | 98     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
| X  | 87     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
|  | 92     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
|  | 98     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 40                 |                                | 2  |       |
| % Plants Showing                               |        | <u>Moderate Use</u>        |   |   | <u>Heavy Use</u> |    |   | <u>Poor Vigor</u> |   |   | <u>%Change</u> |     |      |      |                    |                                |    |       |
| '87  |        | 00%                        |   |   | 00%              |    |   | 00%               |   |   |                |     |      |      |                    |                                |    |       |
| '92  |        | 37%                        |   |   | 02%              |    |   | 00%               |   |   | +30%           |     |      |      |                    |                                |    |       |
| '98  |        | 01%                        |   |   | 00%              |    |   | 00%               |   |   |                |     |      |      |                    |                                |    |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                  |    |   |                   |   |   |                | '87 | 0    | Dec: | 0%                 |                                |    |       |
|  |        |                            |   |   |                  |    |   |                   |   |   |                | '92 | 1040 |      | 4%                 |                                |    |       |
|  |        |                            |   |   |                  |    |   |                   |   |   |                | '98 | 1480 |      | 0%                 |                                |    |       |
| Artemisia nova                                 |        |                            |   |   |                  |    |   |                   |   |   |                |     |      |      |                    |                                |    |       |
| Y  | 87     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
|  | 92     | 4                          | 1 | 1 | 2                | -  | - | -                 | - | - | 8              | -   | -    | -    | 160                |                                | 8  |       |
|  | 98     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
| M  | 87     | -                          | - | 1 | -                | -  | - | -                 | - | - | 1              | -   | -    | -    | 66                 | 16 26                          | 1  |       |
|  | 92     | 3                          | 7 | 1 | -                | -  | - | -                 | - | - | 11             | -   | -    | -    | 220                | - -                            | 11 |       |
|  | 98     | -                          | 2 | - | -                | -  | - | -                 | - | - | 2              | -   | -    | -    | 40                 | 12 23                          | 2  |       |
| D  | 87     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
|  | 92     | -                          | 4 | 2 | -                | -  | - | -                 | - | - | 5              | -   | -    | 1    | 120                |                                | 6  |       |
|  | 98     | 4                          | - | - | -                | -  | - | -                 | - | - | 4              | -   | -    | -    | 80                 |                                | 4  |       |
| X  | 87     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
|  | 92     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0  |       |
|  | 98     | -                          | - | - | -                | -  | - | -                 | - | - | -              | -   | -    | -    | 100                |                                | 5  |       |
| % Plants Showing                               |        | <u>Moderate Use</u>        |   |   | <u>Heavy Use</u> |    |   | <u>Poor Vigor</u> |   |   | <u>%Change</u> |     |      |      |                    |                                |    |       |
| '87  |        | 00%                        |   |   | 100%             |    |   | 00%               |   |   | +87%           |     |      |      |                    |                                |    |       |
| '92  |        | 48%                        |   |   | 16%              |    |   | 04%               |   |   | -76%           |     |      |      |                    |                                |    |       |
| '98  |        | 33%                        |   |   | 00%              |    |   | 00%               |   |   |                |     |      |      |                    |                                |    |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                  |    |   |                   |   |   |                | '87 | 66   | Dec: | 0%                 |                                |    |       |
|  |        |                            |   |   |                  |    |   |                   |   |   |                | '92 | 500  |      | 24%                |                                |    |       |
|  |        |                            |   |   |                  |    |   |                   |   |   |                | '98 | 120  |      | 67%                |                                |    |       |

| A<br>G<br>E                                    | Y<br>R | Form Class (No. of Plants) |    |    |                  |   |   |                   |   |   | Vigor Class    |     |      |      | Plants<br>Per Acre | Average<br>(inches)<br>Ht. Cr. | Total |
|--|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-------|
|  |        | 1                          | 2  | 3  | 4                | 5 | 6 | 7                 | 8 | 9 | 1              | 2   | 3    | 4    |                    |                                |       |
| Artemisia tridentata wyomingensis              |        |                            |    |    |                  |   |   |                   |   |   |                |     |      |      |                    |                                |       |
| S  | 87     | 5                          | -  | -  | -                | - | - | -                 | - | - | 5              | -   | -    | -    | 333                |                                | 5     |
|  | 92     | 34                         | -  | -  | 6                | - | - | 5                 | - | - | 45             | -   | -    | -    | 900                |                                | 45    |
|  | 98     | 4                          | -  | -  | -                | - | - | -                 | - | - | 4              | -   | -    | -    | 80                 |                                | 4     |
| Y  | 87     | 5                          | 2  | -  | -                | - | - | -                 | - | - | 7              | -   | -    | -    | 466                |                                | 7     |
|  | 92     | 163                        | 22 | 1  | 78               | - | - | 3                 | - | - | 267            | -   | -    | -    | 5340               |                                | 267   |
|  | 98     | 26                         | 10 | -  | -                | - | - | -                 | - | - | 36             | -   | -    | -    | 720                |                                | 36    |
| M  | 87     | -                          | 12 | 9  | -                | - | - | -                 | - | - | 21             | -   | -    | -    | 1400               | 18 28                          | 21    |
|  | 92     | 33                         | 41 | 9  | -                | - | - | -                 | - | - | 82             | -   | 1    | -    | 1660               | - -                            | 83    |
|  | 98     | 30                         | 63 | 3  | 2                | - | - | -                 | - | - | 98             | -   | -    | -    | 1960               | 15 24                          | 98    |
| D  | 87     | -                          | 1  | 8  | -                | - | - | -                 | - | - | 8              | -   | -    | 1    | 600                |                                | 9     |
|  | 92     | 25                         | 29 | 35 | 2                | 8 | - | 2                 | - | - | 78             | 2   | 16   | 5    | 2020               |                                | 101   |
|  | 98     | 24                         | 36 | 9  | -                | - | - | -                 | - | - | 45             | 1   | -    | 23   | 1380               |                                | 69    |
| X  | 87     | -                          | -  | -  | -                | - | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0     |
|  | 92     | -                          | -  | -  | -                | - | - | -                 | - | - | -              | -   | -    | -    | 0                  |                                | 0     |
|  | 98     | -                          | -  | -  | -                | - | - | -                 | - | - | -              | -   | -    | -    | 1380               |                                | 69    |
| % Plants Showing                               |        | <u>Moderate Use</u>        |    |    | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u> |     |      |      |                    |                                |       |
| '87  |        | 41%                        |    |    | 46%              |   |   | 03%               |   |   | +73%           |     |      |      |                    |                                |       |
| '92  |        | 22%                        |    |    | 10%              |   |   | 05%               |   |   | -55%           |     |      |      |                    |                                |       |
| '98  |        | 54%                        |    |    | 06%              |   |   | 11%               |   |   |                |     |      |      |                    |                                |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |    |    |                  |   |   |                   |   |   |                | '87 | 2466 | Dec: | 24%                |                                |       |
|  |        |                            |    |    |                  |   |   |                   |   |   |                | '92 | 9020 |      | 22%                |                                |       |
|  |        |                            |    |    |                  |   |   |                   |   |   |                | '98 | 4060 |      | 34%                |                                |       |
| Chrysothamnus depressus                        |        |                            |    |    |                  |   |   |                   |   |   |                |     |      |      |                    |                                |       |
| M  | 87     | -                          | -  | -  | -                | - | - | -                 | - | - | -              | -   | -    | -    | 0                  | - -                            | 0     |
|  | 92     | -                          | -  | -  | 1                | - | - | -                 | - | - | 1              | -   | -    | -    | 20                 | - -                            | 1     |
|  | 98     | -                          | -  | -  | -                | - | - | -                 | - | - | -              | -   | -    | -    | 0                  | - -                            | 0     |
| % Plants Showing                               |        | <u>Moderate Use</u>        |    |    | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u> |     |      |      |                    |                                |       |
| '87  |        | 00%                        |    |    | 00%              |   |   | 00%               |   |   |                |     |      |      |                    |                                |       |
| '92  |        | 00%                        |    |    | 00%              |   |   | 00%               |   |   |                |     |      |      |                    |                                |       |
| '98  |        | 00%                        |    |    | 00%              |   |   | 00%               |   |   |                |     |      |      |                    |                                |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |    |    |                  |   |   |                   |   |   |                | '87 | 0    | Dec: | -                  |                                |       |
|  |        |                            |    |    |                  |   |   |                   |   |   |                | '92 | 20   |      | -                  |                                |       |
|  |        |                            |    |    |                  |   |   |                   |   |   |                | '98 | 0    |      | -                  |                                |       |

| A<br>G<br>E                                    | Y<br>R | Form Class (No. of Plants) |   |   |                  |   |   |                   |   |   | Vigor Class    |     |       |      | Plants<br>Per Acre | Average<br>(inches)<br>Ht. Cr. |     | Total |
|--|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-------|------|--------------------|--------------------------------|-----|-------|
|  |        | 1                          | 2 | 3 | 4                | 5 | 6 | 7                 | 8 | 9 | 1              | 2   | 3     | 4    |                    |                                |     |       |
| Gutierrezia sarothrae                          |        |                            |   |   |                  |   |   |                   |   |   |                |     |       |      |                    |                                |     |       |
| S  | 87     | 21                         | - | - | -                | - | - | -                 | - | - | 21             | -   | -     | -    | 1400               |                                | 21  |       |
|  | 92     | 739                        | - | - | 15               | - | - | -                 | - | - | 754            | -   | -     | -    | 15080              |                                | 754 |       |
|  | 98     | 91                         | - | - | -                | - | - | -                 | - | - | 91             | -   | -     | -    | 1820               |                                | 91  |       |
| Y  | 87     | 8                          | - | - | -                | - | - | -                 | - | - | 8              | -   | -     | -    | 533                |                                | 8   |       |
|  | 92     | 155                        | - | - | 3                | - | - | -                 | - | - | 158            | -   | -     | -    | 3160               |                                | 158 |       |
|  | 98     | 133                        | - | - | -                | - | - | -                 | - | - | 133            | -   | -     | -    | 2660               |                                | 133 |       |
| M  | 87     | 36                         | - | - | -                | - | - | -                 | - | - | 36             | -   | -     | -    | 2400               | 11                             | 12  | 36    |
|  | 92     | 460                        | - | - | 7                | - | - | -                 | - | - | 467            | -   | -     | -    | 9340               | -                              | -   | 467   |
|  | 98     | 300                        | - | - | -                | - | - | -                 | - | - | 300            | -   | -     | -    | 6000               | 10                             | 9   | 300   |
| D  | 87     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -     | -    | 0                  |                                | 0   |       |
|  | 92     | 2                          | - | - | -                | - | - | -                 | - | - | 1              | -   | 1     | -    | 40                 |                                | 2   |       |
|  | 98     | 1                          | - | - | -                | - | - | -                 | - | - | -              | -   | -     | 1    | 20                 |                                | 1   |       |
| X  | 87     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -     | -    | 0                  |                                | 0   |       |
|  | 92     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -     | -    | 0                  |                                | 0   |       |
|  | 98     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -     | -    | 80                 |                                | 4   |       |
| % Plants Showing                               |        | <u>Moderate Use</u>        |   |   | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u> |     |       |      |                    |                                |     |       |
| '87  |        | 00%                        |   |   | 00%              |   |   | 00%               |   |   | +77%           |     |       |      |                    |                                |     |       |
| '92  |        | 00%                        |   |   | 00%              |   |   | .15%              |   |   | -31%           |     |       |      |                    |                                |     |       |
| '98  |        | 00%                        |   |   | 00%              |   |   | .23%              |   |   |                |     |       |      |                    |                                |     |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                  |   |   |                   |   |   |                | '87 | 2933  | Dec: | 0%                 |                                |     |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '92 | 12540 |      | 0%                 |                                |     |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '98 | 8680  |      | 0%                 |                                |     |       |
| Juniperus osteosperma                          |        |                            |   |   |                  |   |   |                   |   |   |                |     |       |      |                    |                                |     |       |
| S  | 87     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -     | -    | 0                  |                                | 0   |       |
|  | 92     | 2                          | - | - | 1                | - | - | 1                 | - | - | 4              | -   | -     | -    | 80                 |                                | 4   |       |
|  | 98     | 1                          | - | - | -                | - | - | -                 | - | - | 1              | -   | -     | -    | 20                 |                                | 1   |       |
| Y  | 87     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -     | -    | 0                  |                                | 0   |       |
|  | 92     | 1                          | - | - | -                | 1 | - | -                 | - | - | 2              | -   | -     | -    | 40                 |                                | 2   |       |
|  | 98     | 1                          | - | - | -                | - | - | -                 | - | - | 1              | -   | -     | -    | 20                 |                                | 1   |       |
| M  | 87     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -     | -    | 0                  | -                              | -   | 0     |
|  | 92     | -                          | - | - | -                | - | - | -                 | 2 | 1 | 3              | -   | -     | -    | 60                 | -                              | -   | 3     |
|  | 98     | -                          | - | - | -                | - | - | 2                 | 1 | - | 3              | -   | -     | -    | 60                 | -                              | -   | 3     |
| % Plants Showing                               |        | <u>Moderate Use</u>        |   |   | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u> |     |       |      |                    |                                |     |       |
| '87  |        | 00%                        |   |   | 00%              |   |   | 00%               |   |   |                |     |       |      |                    |                                |     |       |
| '92  |        | 20%                        |   |   | 20%              |   |   | 00%               |   |   | -20%           |     |       |      |                    |                                |     |       |
| '98  |        | 00%                        |   |   | 00%              |   |   | 00%               |   |   |                |     |       |      |                    |                                |     |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                  |   |   |                   |   |   |                | '87 | 0     | Dec: | -                  |                                |     |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '92 | 100   |      | -                  |                                |     |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '98 | 80    |      | -                  |                                |     |       |

| A<br>G<br>E                                    | Y<br>R | Form Class (No. of Plants) |   |   |                  |   |   |                   |   |   | Vigor Class    |     |     |      | Plants<br>Per Acre | Average<br>(inches)<br>Ht. Cr. |    | Total |
|--|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
|  |        | 1                          | 2 | 3 | 4                | 5 | 6 | 7                 | 8 | 9 | 1              | 2   | 3   | 4    |                    |                                |    |       |
| Opuntia spp.                                   |        |                            |   |   |                  |   |   |                   |   |   |                |     |     |      |                    |                                |    |       |
| Y  | 87     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -   | -    | 0                  |                                | 0  |       |
|  | 92     | 1                          | - | - | -                | - | - | -                 | - | - | 1              | -   | -   | -    | 20                 |                                | 1  |       |
|  | 98     | 1                          | - | - | -                | - | - | -                 | - | - | 1              | -   | -   | -    | 20                 |                                | 1  |       |
| M  | 87     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -   | -    | 0                  | -                              | 0  |       |
|  | 92     | -                          | - | - | 1                | - | - | -                 | - | - | 1              | -   | -   | -    | 20                 | -                              | 1  |       |
|  | 98     | 2                          | - | - | -                | - | - | -                 | - | - | 2              | -   | -   | -    | 40                 | 6                              | 2  |       |
| % Plants Showing                               |        | <u>Moderate Use</u>        |   |   | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u> |     |     |      |                    |                                |    |       |
| '87  |        | 00%                        |   |   | 00%              |   |   | 00%               |   |   |                |     |     |      |                    |                                |    |       |
| '92  |        | 00%                        |   |   | 00%              |   |   | 00%               |   |   | +33%           |     |     |      |                    |                                |    |       |
| '98  |        | 00%                        |   |   | 00%              |   |   | 00%               |   |   |                |     |     |      |                    |                                |    |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                  |   |   |                   |   |   |                | '87 | 0   | Dec: | -                  |                                |    |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '92 | 40  |      | -                  |                                |    |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '98 | 60  |      | -                  |                                |    |       |
| Peraphyllum ramosissimum                       |        |                            |   |   |                  |   |   |                   |   |   |                |     |     |      |                    |                                |    |       |
| M  | 87     | -                          | - | 1 | -                | - | - | -                 | - | - | 1              | -   | -   | -    | 66                 | 35                             | 71 |       |
|  | 92     | -                          | - | - | -                | 2 | - | -                 | - | - | 2              | -   | -   | -    | 40                 | -                              | -  |       |
|  | 98     | -                          | - | 2 | -                | - | - | -                 | - | - | 2              | -   | -   | -    | 40                 | 53                             | 63 |       |
| % Plants Showing                               |        | <u>Moderate Use</u>        |   |   | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u> |     |     |      |                    |                                |    |       |
| '87  |        | 00%                        |   |   | 100%             |   |   | 00%               |   |   | -39%           |     |     |      |                    |                                |    |       |
| '92  |        | 100%                       |   |   | 00%              |   |   | 00%               |   |   | + 0%           |     |     |      |                    |                                |    |       |
| '98  |        | 00%                        |   |   | 100%             |   |   | 00%               |   |   |                |     |     |      |                    |                                |    |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                  |   |   |                   |   |   |                | '87 | 66  | Dec: | -                  |                                |    |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '92 | 40  |      | -                  |                                |    |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '98 | 40  |      | -                  |                                |    |       |
| Pinus edulis                                   |        |                            |   |   |                  |   |   |                   |   |   |                |     |     |      |                    |                                |    |       |
| S  | 87     | 3                          | - | - | -                | - | - | -                 | - | - | 3              | -   | -   | -    | 200                |                                | 3  |       |
|  | 92     | -                          | - | - | 1                | 1 | - | 1                 | - | - | 3              | -   | -   | -    | 60                 |                                | 3  |       |
|  | 98     | 5                          | - | - | 1                | - | - | -                 | - | - | 6              | -   | -   | -    | 120                |                                | 6  |       |
| Y  | 87     | -                          | - | - | -                | - | - | -                 | - | - | -              | -   | -   | -    | 0                  |                                | 0  |       |
|  | 92     | 1                          | - | - | -                | - | - | 1                 | - | - | 2              | -   | -   | -    | 40                 |                                | 2  |       |
|  | 98     | 5                          | - | - | -                | - | - | -                 | - | - | 5              | -   | -   | -    | 100                |                                | 5  |       |
| % Plants Showing                               |        | <u>Moderate Use</u>        |   |   | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u> |     |     |      |                    |                                |    |       |
| '87  |        | 00%                        |   |   | 00%              |   |   | 00%               |   |   |                |     |     |      |                    |                                |    |       |
| '92  |        | 00%                        |   |   | 00%              |   |   | 00%               |   |   | +60%           |     |     |      |                    |                                |    |       |
| '98  |        | 00%                        |   |   | 00%              |   |   | 00%               |   |   |                |     |     |      |                    |                                |    |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                  |   |   |                   |   |   |                | '87 | 0   | Dec: | -                  |                                |    |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '92 | 40  |      | -                  |                                |    |       |
|  |        |                            |   |   |                  |   |   |                   |   |   |                | '98 | 100 |      | -                  |                                |    |       |

| A<br>Y<br>G<br>R<br>E                          | Form Class (No. of Plants) | Vigor Class         |   |   |                  |   |   |                   |   |   | Plants<br>Per Acre | Average<br>(inches) |      | Total |     |     |     |     |
|--|----------------------------|---------------------|---|---|------------------|---|---|-------------------|---|---|--------------------|---------------------|------|-------|-----|-----|-----|-----|
|  |                            | 1                   | 2 | 3 | 4                | 5 | 6 | 7                 | 8 | 9 |                    | 1                   | 2    |       | 3   | 4   | Ht. | Cr. |
| Purshia tridentata                             |                            |                     |   |   |                  |   |   |                   |   |   |                    |                     |      |       |     |     |     |     |
| M  | 87                         | -                   | - | 1 | -                | - | - | -                 | - | - | 1                  | -                   | -    | -     | 66  | 19  | 53  | 1   |
|  | 92                         | -                   | - | - | -                | - | - | -                 | - | - | -                  | -                   | -    | -     | 0   | -   | -   | 0   |
|  | 98                         | -                   | - | - | -                | - | - | -                 | - | - | -                  | -                   | -    | -     | 0   | 28  | 47  | 0   |
| % Plants Showing                               |                            | <u>Moderate Use</u> |   |   | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u>     |                     |      |       |     |     |     |     |
|  |                            | '87                 |   |   | 00%              |   |   | 100%              |   |   | 00%                |                     |      |       |     |     |     |     |
|  |                            | '92                 |   |   | 00%              |   |   | 00%               |   |   | 00%                |                     |      |       |     |     |     |     |
|  |                            | '98                 |   |   | 00%              |   |   | 00%               |   |   | 00%                |                     |      |       |     |     |     |     |
| Total Plants/Acre (excluding Dead & Seedlings) |                            |                     |   |   |                  |   |   |                   |   |   | '87                | 66                  | Dec: | -     |     |     |     |     |
|  |                            |                     |   |   |                  |   |   |                   |   |   | '92                | 0                   |      | -     |     |     |     |     |
|  |                            |                     |   |   |                  |   |   |                   |   |   | '98                | 0                   |      | -     |     |     |     |     |
| Quercus gambelii                               |                            |                     |   |   |                  |   |   |                   |   |   |                    |                     |      |       |     |     |     |     |
| S  | 87                         | 9                   | - | - | -                | - | - | -                 | - | - | 9                  | -                   | -    | -     | 600 |     |     | 9   |
|  | 92                         | -                   | - | - | 1                | - | - | -                 | - | - | 1                  | -                   | -    | -     | 20  |     |     | 1   |
|  | 98                         | 2                   | - | - | -                | - | - | -                 | - | - | 2                  | -                   | -    | -     | 40  |     |     | 2   |
| Y  | 87                         | 5                   | - | - | -                | - | - | -                 | - | - | 5                  | -                   | -    | -     | 333 |     |     | 5   |
|  | 92                         | -                   | - | - | 4                | - | - | -                 | - | - | 4                  | -                   | -    | -     | 80  |     |     | 4   |
|  | 98                         | -                   | - | - | -                | - | - | -                 | - | - | -                  | -                   | -    | -     | 0   |     |     | 0   |
| M  | 87                         | 2                   | - | - | -                | - | - | -                 | - | - | 2                  | -                   | -    | -     | 133 | 198 | 162 | 2   |
|  | 92                         | 1                   | 3 | - | -                | - | - | -                 | - | - | 4                  | -                   | -    | -     | 80  | -   | -   | 4   |
|  | 98                         | -                   | - | - | 5                | - | - | -                 | 7 | - | 12                 | -                   | -    | -     | 240 | 53  | 35  | 12  |
| X  | 87                         | -                   | - | - | -                | - | - | -                 | - | - | -                  | -                   | -    | -     | 0   |     |     | 0   |
|  | 92                         | -                   | - | - | -                | - | - | -                 | - | - | -                  | -                   | -    | -     | 0   |     |     | 0   |
|  | 98                         | -                   | - | - | -                | - | - | -                 | - | - | -                  | -                   | -    | -     | 40  |     |     | 2   |
| % Plants Showing                               |                            | <u>Moderate Use</u> |   |   | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u>     |                     |      |       |     |     |     |     |
|  |                            | '87                 |   |   | 00%              |   |   | 00%               |   |   | 00%                |                     |      | -66%  |     |     |     |     |
|  |                            | '92                 |   |   | 38%              |   |   | 00%               |   |   | 00%                |                     |      | +33%  |     |     |     |     |
|  |                            | '98                 |   |   | 00%              |   |   | 00%               |   |   | 00%                |                     |      |       |     |     |     |     |
| Total Plants/Acre (excluding Dead & Seedlings) |                            |                     |   |   |                  |   |   |                   |   |   | '87                | 466                 | Dec: | -     |     |     |     |     |
|  |                            |                     |   |   |                  |   |   |                   |   |   | '92                | 160                 |      | -     |     |     |     |     |
|  |                            |                     |   |   |                  |   |   |                   |   |   | '98                | 240                 |      | -     |     |     |     |     |
| Ribes cereum cereum                            |                            |                     |   |   |                  |   |   |                   |   |   |                    |                     |      |       |     |     |     |     |
| M  | 87                         | -                   | - | - | -                | - | - | -                 | - | - | -                  | -                   | -    | -     | 0   | -   | -   | 0   |
|  | 92                         | -                   | - | - | -                | - | - | -                 | - | - | -                  | -                   | -    | -     | 0   | -   | -   | 0   |
|  | 98                         | 17                  | - | - | -                | - | - | -                 | - | - | 17                 | -                   | -    | -     | 340 | -   | -   | 17  |
| % Plants Showing                               |                            | <u>Moderate Use</u> |   |   | <u>Heavy Use</u> |   |   | <u>Poor Vigor</u> |   |   | <u>%Change</u>     |                     |      |       |     |     |     |     |
|  |                            | '87                 |   |   | 00%              |   |   | 00%               |   |   | 00%                |                     |      |       |     |     |     |     |
|  |                            | '92                 |   |   | 00%              |   |   | 00%               |   |   | 00%                |                     |      |       |     |     |     |     |
|  |                            | '98                 |   |   | 00%              |   |   | 00%               |   |   | 00%                |                     |      |       |     |     |     |     |
| Total Plants/Acre (excluding Dead & Seedlings) |                            |                     |   |   |                  |   |   |                   |   |   | '87                | 0                   | Dec: | -     |     |     |     |     |
|  |                            |                     |   |   |                  |   |   |                   |   |   | '92                | 0                   |      | -     |     |     |     |     |
|  |                            |                     |   |   |                  |   |   |                   |   |   | '98                | 340                 |      | -     |     |     |     |     |

### Trend Study 29-2-98

Study site name: Smith's Mesa .

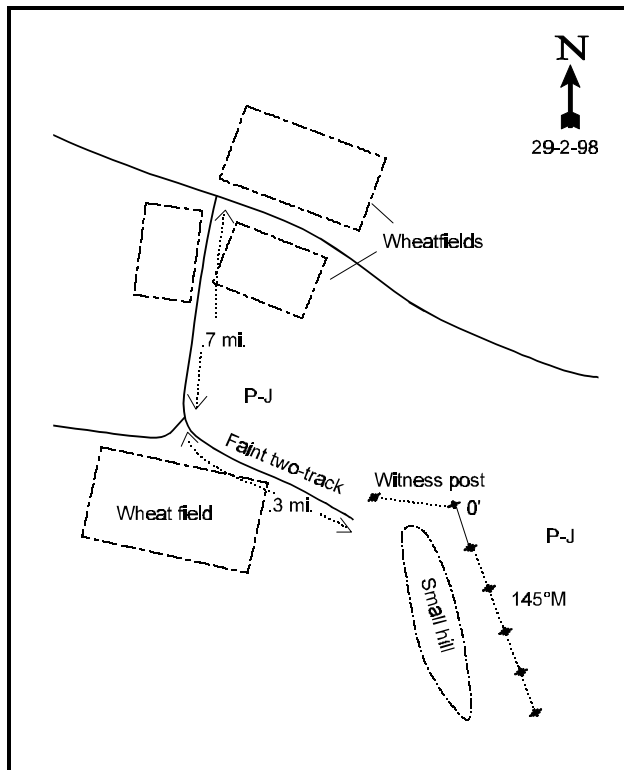
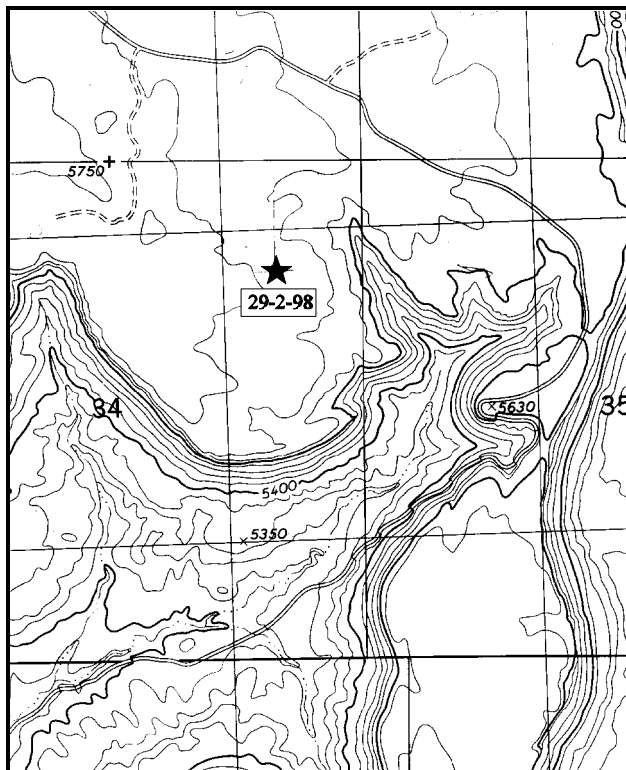
Range type: Big Sagebrush-Grass .

Compass azimuth: frequency baseline 145 M degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11 ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

### LOCATION DESCRIPTION

From mile marker 18 in Virgin, drive west 0.9 miles to a road on the north side of the road. Drive up the old paved road up to the mesa top for 3.35 miles to a fork. Turn right and continue 4.1 miles to a small dirt road next to a wheat field on the left side of the main road. Turn left and follow this road 0.7 miles to a fork next to another wheat field. Turn left and follow the edge of the field 0.3 miles and stop. Walk east over a small P-J covered hill to a sage opening. The 0-foot stake is on the north end of the opening near some *Quercus turbinella*. The baseline runs at 145° magnetic and is marked by half-high green fenceposts.



Map Name Smith Mesa

Diagrammatic Sketch

Township 40S , Range 12W , Section 34

UTM 4126851.082 N, 306165.742 E

## DISCUSSION

### Trend Study No. 29-2

The Smith's Mesa trend study was established in a Wyoming big sagebrush clearing on Smith Mesa. It is surrounded on 3 sides by pinyon and juniper trees, and dryland wheat fields to the west. Slope is gentle (2-3%) with a southwest aspect and an elevation of above 5,600 feet. The large mesa is found about 3 miles north of the town of Virgin. It rises about 2,000 feet about the town and supports many sagebrush openings surrounded by pinyon and juniper woodland. Some dryland wheat fields are also found on the south end of the mesa, on a large area of private land. Smith Mesa provides important winter range for deer which summer in the Zion Park area. Pellet group data from the site estimate 38 deer days use/acre. Some cattle sign was also encountered with an estimated 7 cow days use/acre. A cattle pond is found about 1/3 of a mile east of the site.

Soil on the site is very sandy and relatively deep. Effective rooting depth (see methods) was estimated at 23 inches. Soil texture is a sandy loam with a slightly acid pH (6.2). Phosphorus may be limiting to plant growth at 8.1 ppm, when 10 ppm is considered a minimum value for normal plant development. Rock is absent on the surface and in the profile. Due to the sandy nature of the soil, average soil temperature is moderately high at 70.6°F at a depth of 21 inches. Under most conditions, this would cause rapid drying of the soil within the surface horizons during the summer. Herbaceous plants, mostly in the form of winter annuals, are common and provide adequate soil protection. In addition, cryptogamic crusts are abundant, leaving 33% of the ground surface exposed as bare ground. There appears to be some pedestaling of soil around shrubs, possibly caused as much by wind as water. However, erosion is not a problem due to the gentle terrain.

The site supports a good stand of Wyoming big sagebrush with a few antelope bitterbrush. Sagebrush is estimated at 2,200 plants/acre which provide 66% of the shrub cover. The majority of these plants are mature (76%). Thirteen percent of the population were classified as decadent, with 43% of these classified as dying. Biotic potential is fairly good at 9% with another 10% of the population consisting of young plants. Utilization of the sagebrush is mostly light to moderate with heavy use reported on some isolated plants. Vigor is good on most plants and percent decadence is relatively low. Only a few bitterbrush plants occur on the site and only 1 was sampled.

Broom snakeweed, the increaser/invaser, is the most abundant shrub on the site with a population of 5,380 plants/acre. Ninety percent of the population is mature, although young plants are common and more than adequate to maintain the population. Pinyon and juniper trees appear to be slowly encroaching into the clearing, but numbers are still low. Point quarter data estimate 6 Utah juniper and 6 singleleaf pinyon trees/acre. Average basal diameter is 10.4 inches for pinyon and 5.7 inches for juniper.

The herbaceous understory is very poor with two annual grasses, cheatgrass and six weeks fescue, providing 100% of the grass cover. Also, annual forbs account for 96% of the forb cover. Three perennial grasses were encountered on the site, although they are rare and often growing in the protection of shrub crowns. The only fairly abundant forb consists of the annual storksbill.

### 1998 APPARENT TREND ASSESSMENT

Trend for soil appears stable, primarily due to the level terrain and rapid infiltration capacity of the soil. Trend for browse also appears stable with a relatively healthy population of Wyoming big sagebrush. Use is light to moderate, vigor normal, and percent decadence moderately low at 13%. Reproduction is adequate to maintain the population if conditions do not change significantly. The herbaceous understory is poor. Composition of grasses and forbs is totally dominated by annuals. Perennial species are present yet rare.

## HERBACEOUS TRENDS --

Herd unit 29 , Study no: 2

| T<br>y<br>p<br>e            | Species                   | Nested<br>Frequency<br>'98 | Quadrat<br>Frequency<br>'98 | Average<br>Cover %<br>'98 |
|-----------------------------|---------------------------|----------------------------|-----------------------------|---------------------------|
| G                           | Bromus tectorum (a)       | 436                        | 99                          | 22.90                     |
| G                           | Poa secunda               | 15                         | 5                           | .05                       |
| G                           | Sitanion hystrix          | -                          | -                           | .00                       |
| G                           | Sporobolus cryptandrus    | 2                          | 1                           | .03                       |
| G                           | Vulpia octoflora (a)      | 304                        | 85                          | 7.54                      |
| Total for Annual Grasses    |                           | 740                        | 184                         | 30.45                     |
| Total for Perennial Grasses |                           | 17                         | 6                           | 0.08                      |
| Total for Grasses           |                           | 757                        | 190                         | 30.53                     |
| F                           | Draba spp. (a)            | 25                         | 10                          | .05                       |
| F                           | Erodium cicutarium (a)    | 78                         | 23                          | 1.95                      |
| F                           | Eriogonum umbellatum      | 4                          | 1                           | .03                       |
| F                           | Lappula occidentalis (a)  | 32                         | 12                          | .11                       |
| F                           | Microsteris gracilis (a)  | 17                         | 7                           | .06                       |
| F                           | Navarretia intertexta (a) | 5                          | 2                           | .03                       |
| F                           | Oenothera pallida         | 4                          | 2                           | .01                       |
| F                           | Orobancha fasciculata     | 1                          | 1                           | .00                       |
| F                           | Plantago patagonica (a)   | 11                         | 3                           | .39                       |
| F                           | Polygonum douglasii (a)   | 3                          | 1                           | .00                       |
| F                           | Senecio multilobatus      | 17                         | 6                           | .05                       |
| F                           | Unknown forb-perennial    | 2                          | 1                           | .00                       |
| Total for Annual Forbs      |                           | 171                        | 58                          | 2.60                      |
| Total for Perennial Forbs   |                           | 28                         | 11                          | 0.11                      |
| Total for Forbs             |                           | 199                        | 69                          | 2.71                      |



## BROWSE TRENDS --

Herd unit 29 , Study no: 2

| T<br>y<br>p<br>e | Species                                      | Strip<br>Frequency<br>'98 | Average<br>Cover %<br>'98 |
|------------------|--|---------------------------|---------------------------|
| B                | Artemisia tridentata<br>wyomingensis         | 54                        | 11.80                     |
| B                | Chrysothamnus viscidiflorus<br>viscidiflorus | 0                         | -                         |
| B                | Gutierrezia sarothrae                        | 51                        | 3.29                      |
| B                | Juniperus osteosperma                        | -                         | .78                       |
| B                | Opuntia spp.                                 | 3                         | .18                       |
| B                | Pinus monophylla                             | 1                         | 1.70                      |
| B                | Purshia tridentata                           | 1                         | .00                       |
| B                | Salvia dorrii                                | 1                         | -                         |
| Total for Browse |  | 111                       | 17.76                     |

## CANOPY COVER --

Herd unit 29 , Study no: 2

| Species          | Percent Cover<br>'98 |
|------------------|----------------------|
| Pinus monophylla | 1                    |

## BASIC COVER --

Herd unit 29 , Study no: 2

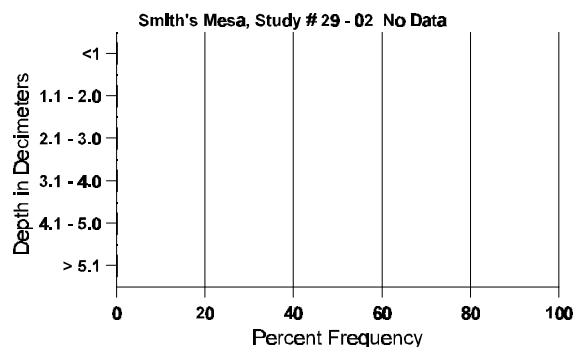
| Cover Type  | Nested<br>Frequency<br>'98 | Average<br>Cover %<br>'98 |
|-------------|----------------------------|---------------------------|
| Vegetation  | 472                        | 46.12                     |
| Rock        | 6                          | .03                       |
| Pavement    | 24                         | .04                       |
| Litter      | 486                        | 39.47                     |
| Cryptogams  | 244                        | 12.36                     |
| Bare Ground | 381                        | 33.09                     |

## SOIL ANALYSIS DATA --

Herd Unit 29, Study # 02, Study Name: Smith's Mesa

| Effective<br>rooting depth (inches) | Temp °F<br>(depth) | pH  | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|-------------------------------------|--------------------|-----|-------|-------|-------|-----|-------|-------|------|
| 23.2                                | 70.6<br>(20.9)     | 6.2 | 72.7  | 17.4  | 9.8   | .7  | 8.1   | 3.2   | .2   |

# Stoniness Index



## PELLET GROUP FREQUENCY --

Herd unit 29 , Study no: 2

| Type   | Quadrat Frequency '98 |
|--------|-----------------------|
| Rabbit | 23                    |
| Deer   | 44                    |
| Cattle | 1                     |

## BROWSE CHARACTERISTICS --

Herd unit 29 , Study no: 2

| A<br>G<br>R<br>E                               | Y  | Form Class (No. of Plants) |    |   |                         |   |   |                          |   |   | Vigor Class    |   |   |     | Plants<br>Per Acre | Average<br>(inches)<br>Ht. Cr. |     | Total |
|--|----|----------------------------|----|---|-------------------------|---|---|--------------------------|---|---|----------------|---|---|-----|--------------------|--------------------------------|-----|-------|
|  |    | 1                          | 2  | 3 | 4                       | 5 | 6 | 7                        | 8 | 9 | 1              | 2 | 3 | 4   |                    |                                |     |       |
| Artemisia tridentata wyomingensis              |    |                            |    |   |                         |   |   |                          |   |   |                |   |   |     |                    |                                |     |       |
| S  | 98 | 1                          | -  | - | -                       | - | - | -                        | - | - | 1              | - | - | -   | 20                 |                                | 1   |       |
| Y  | 98 | 7                          | 3  | 1 | -                       | - | - | -                        | - | - | 11             | - | - | -   | 220                |                                | 11  |       |
| M  | 98 | 56                         | 26 | 3 | -                       | - | - | -                        | - | - | 85             | - | - | -   | 1700               | 28 39                          | 85  |       |
| D  | 98 | 11                         | 2  | - | 1                       | - | - | -                        | - | - | 8              | - | - | 6   | 280                |                                | 14  |       |
| X  | 98 | -                          | -  | - | -                       | - | - | -                        | - | - | -              | - | - | -   | 340                |                                | 17  |       |
| % Plants Showing '98                           |    | <u>Moderate Use</u><br>28% |    |   | <u>Heavy Use</u><br>04% |   |   | <u>Poor Vigor</u><br>05% |   |   | <u>%Change</u> |   |   |     |                    |                                |     |       |
| Total Plants/Acre (excluding Dead & Seedlings) |    |                            |    |   |                         |   |   |                          |   |   |                |   |   | '98 | 2200               | Dec:                           | 13% |       |
| Chrysothamnus viscidiflorus viscidiflorus      |    |                            |    |   |                         |   |   |                          |   |   |                |   |   |     |                    |                                |     |       |
| M  | 98 | -                          | -  | - | -                       | - | - | -                        | - | - | -              | - | - | -   | 0                  | 7 13                           | 0   |       |
| % Plants Showing '98                           |    | <u>Moderate Use</u><br>00% |    |   | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00% |   |   | <u>%Change</u> |   |   |     |                    |                                |     |       |
| Total Plants/Acre (excluding Dead & Seedlings) |    |                            |    |   |                         |   |   |                          |   |   |                |   |   | '98 | 0                  | Dec:                           |     |       |

| A<br>G<br>E                                    | Y<br>R | Form Class (No. of Plants) |   |   |                         |   |   |                           |   |   | Vigor Class    |     |      |      | Plants<br>Per Acre | Average<br>(inches)<br>Ht. Cr. |     | Total |
|--|--------|----------------------------|---|---|-------------------------|---|---|---------------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
|  |        | 1                          | 2 | 3 | 4                       | 5 | 6 | 7                         | 8 | 9 | 1              | 2   | 3    | 4    |                    |                                |     |       |
| Gutierrezia sarothrae                          |        |                            |   |   |                         |   |   |                           |   |   |                |     |      |      |                    |                                |     |       |
| S  | 98     | 1                          | - | - | -                       | - | - | -                         | - | - | 1              | -   | -    | -    | 20                 |                                | 1   |       |
| Y  | 98     | 22                         | - | - | -                       | - | - | -                         | - | - | 22             | -   | -    | -    | 440                |                                | 22  |       |
| M  | 98     | 242                        | - | - | -                       | - | - | -                         | - | - | 242            | -   | -    | -    | 4840               | 9 11                           | 242 |       |
| D  | 98     | 5                          | - | - | -                       | - | - | -                         | - | - | 4              | -   | -    | 1    | 100                |                                | 5   |       |
| X  | 98     | -                          | - | - | -                       | - | - | -                         | - | - | -              | -   | -    | -    | 220                |                                | 11  |       |
| % Plants Showing '98                           |        | <u>Moderate Use</u><br>00% |   |   | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>.37% |   |   | <u>%Change</u> |     |      |      |                    |                                |     |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                         |   |   |                           |   |   |                | '98 | 5380 | Dec: | 2%                 |                                |     |       |
| Opuntia spp.                                   |        |                            |   |   |                         |   |   |                           |   |   |                |     |      |      |                    |                                |     |       |
| M  | 98     | 3                          | - | - | -                       | - | - | -                         | - | - | 3              | -   | -    | -    | 60                 | 6 16                           | 3   |       |
| % Plants Showing '98                           |        | <u>Moderate Use</u><br>00% |   |   | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00%  |   |   | <u>%Change</u> |     |      |      |                    |                                |     |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                         |   |   |                           |   |   |                | '98 | 60   | Dec: | -                  |                                |     |       |
| Pinus monophylla                               |        |                            |   |   |                         |   |   |                           |   |   |                |     |      |      |                    |                                |     |       |
| M  | 98     | -                          | - | - | -                       | - | - | -                         | - | 1 | -              | -   | -    | -    | 20                 | -                              | 1   |       |
| % Plants Showing '98                           |        | <u>Moderate Use</u><br>00% |   |   | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00%  |   |   | <u>%Change</u> |     |      |      |                    |                                |     |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                         |   |   |                           |   |   |                | '98 | 20   | Dec: | -                  |                                |     |       |
| Purshia tridentata                             |        |                            |   |   |                         |   |   |                           |   |   |                |     |      |      |                    |                                |     |       |
| Y  | 98     | 1                          | - | - | -                       | - | - | -                         | - | - | 1              | -   | -    | -    | 20                 |                                | 1   |       |
| M  | 98     | -                          | - | - | -                       | - | - | -                         | - | - | -              | -   | -    | -    | 0                  | 23 99                          | 0   |       |
| % Plants Showing '98                           |        | <u>Moderate Use</u><br>00% |   |   | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00%  |   |   | <u>%Change</u> |     |      |      |                    |                                |     |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                         |   |   |                           |   |   |                | '98 | 20   | Dec: | -                  |                                |     |       |
| Salvia dorrii                                  |        |                            |   |   |                         |   |   |                           |   |   |                |     |      |      |                    |                                |     |       |
| M  | 98     | 1                          | - | - | -                       | - | - | -                         | - | - | 1              | -   | -    | -    | 20                 | 13 46                          | 1   |       |
| % Plants Showing '98                           |        | <u>Moderate Use</u><br>00% |   |   | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00%  |   |   | <u>%Change</u> |     |      |      |                    |                                |     |       |
| Total Plants/Acre (excluding Dead & Seedlings) |        |                            |   |   |                         |   |   |                           |   |   |                | '98 | 20   | Dec: | -                  |                                |     |       |

### Trend Study 29-3-98

Study site name: North Hills .

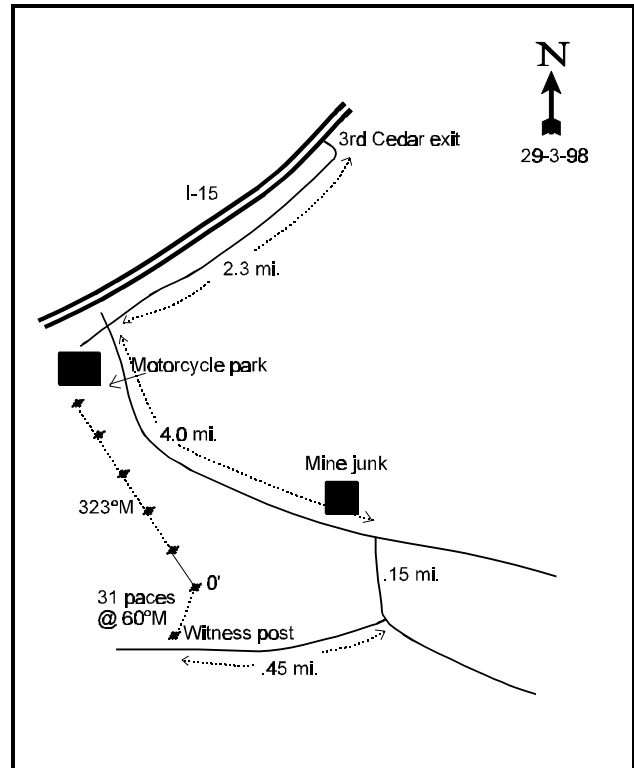
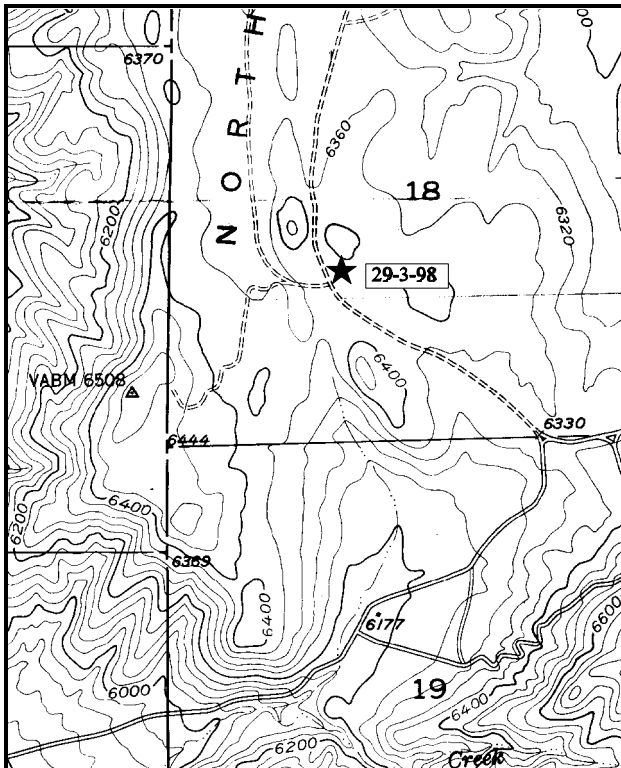
Range type: Chained, Seeded P-J

Compass azimuth: frequency baseline 323 degrees.

Footmark (first frame placement) 5 feet. Frequency belt placement; line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft).

### LOCATION DESCRIPTION

From the third Cedar City exit on the south end of town drive south down the frontage road 2.3 miles. Turn left (east) next to a motorcycle park. Drive south east 4.0 miles on the main road past some old mine wreckage. Turn right and drive south 0.15 miles to a fork turn right (west) and drive 0.45 miles into a chaining and a witness post on the right side of the road (north). The study is marked by green, half-high fenceposts.



Map Name Kanarrville

Diagrammatic Sketch

Township 37S , Range 11W , Section 18

UTM 4161123.287 N , 311511.648 E

## DISCUSSION

### Trend Study No. 29-3

The North Hills trend study was established in 1998 on a chained and seeded pinyon-juniper site in the North Hills, located north of Kanarrville. The area lies between I-15 and the Hurricane Cliffs to the east. The site was chained in 1967 and seeded to crested wheatgrass and intermediate wheatgrass which now dominates the site. The area contains rolling terrain with the study established on a wide ridge top. Slope is gentle (5%) with a south aspect and an elevation of about 6,400 feet. Pinyon pine and Utah juniper trees are found on the site in low densities. Point quarter data estimate only 18 pinyon and 29 juniper trees/acre. Average basal diameter is 2 inches for pinyon and 1.3 inches for juniper. There is some evidence of hand cutting of young trees in the past. Deer use on the site is moderately heavy. There is also some sign of elk and cattle use. Pellet group data estimate 103 deer days use/acre. Most pellet groups appeared to be several months old, but a deer was seen near the site during study site establishment on July 16<sup>th</sup>. Estimated elk and cattle use is low at 6 elk and 4 cow days use/acre. Cows pats appeared to be from last fall.

Soil is shallow with a moderate amount of rock and pavement on the surface and within the profile. Effective rooting depth (see methods) is estimated at only 10 inches. Soil texture is a sandy loam with a neutral pH (6.8). Average soil temperature is very high at 77.8°F at a depth of almost 12 inches. Erosion is not a problem on the site due to the abundant herbaceous vegetation cover, combined with the gentle terrain.

The site supports a variety of browse species including: Utah serviceberry, black sagebrush, Wyoming big sagebrush, and Gambel oak. Wyoming big sagebrush is the most numerous species with a cover value of 13%, representing 73% of the browse cover. Density is estimated at 1,860 plants/acre. Utilization is moderate to heavy with vigor reduced on 13% of the population. Percent decadence is 31%. Reproduction is limited, but currently adequate to replace decadent/dying plants. There is also a small number moderately utilized black sagebrush which are actually black Wyoming big sagebrush hybrids.

Utah serviceberry numbers 1,040 plants/acre. They display light to moderate use, good vigor, and low decadence. There are also some isolated thick oak clones on the site. Mature plants average over 4 feet in height, making much of the oak partly unavailable to browsing. Available plants appear unutilized however. A few scattered moderately hedged bitterbrush provide some additional browse forage.

The herbaceous understory dominates the site with seeded perennial grasses, crested wheatgrass and intermediate wheatgrass, providing 94% of the grass cover and 93% of the total vegetative cover. Four other perennial and 2 annual grasses are also occasionally found on the site. Forbs are severely limited with only 4 species encountered. Combined, forbs produce less than 1/2 of 1% cover.

### 1998 APPARENT TREND ASSESSMENT

The soil appears stable with abundant and well dispersed herbaceous vegetation. The browse trend appears stable for now, but reproduction of the key species, Wyoming big sagebrush, is poor. Utilization of preferred browse species is mostly moderate. There is evidence that sometime in the past about 20% of the population has died off, probably during the extended drought in conjunction with winter injury. The herbaceous understory is abundant, although composition is poor and dominated by seeded grasses. Forbs are nearly absent. Trend will continue to be stable as long as these exotic grasses remain in high numbers.

## HERBACEOUS TRENDS --

Herd unit 29 , Study no: 3

| T<br>y<br>p<br>e            | Species                   | Nested<br>Frequency<br>'98 | Quadrat<br>Frequency<br>'98 | Average<br>Cover %<br>'98 |
|-----------------------------|---------------------------|----------------------------|-----------------------------|---------------------------|
| G                           | Agropyron cristatum       | 271                        | 76                          | 19.65                     |
| G                           | Agropyron intermedium     | 142                        | 52                          | 3.04                      |
| G                           | Bromus tectorum (a)       | 24                         | 8                           | .23                       |
| G                           | Hilaria jamesii           | 6                          | 2                           | .41                       |
| G                           | Oryzopsis hymenoides      | 3                          | 1                           | .00                       |
| G                           | Poa secunda               | 10                         | 3                           | .33                       |
| G                           | Sitanion hystrix          | 21                         | 9                           | .46                       |
| G                           | Vulpia octoflora (a)      | 3                          | 1                           | .00                       |
| Total for Annual Grasses    |                           | 27                         | 9                           | 0.23                      |
| Total for Perennial Grasses |                           | 453                        | 143                         | 23.91                     |
| Total for Grasses           |                           | 480                        | 152                         | 24.15                     |
| F                           | Arabis spp.               | 1                          | 1                           | .00                       |
| F                           | Astragalus spp.           | 12                         | 7                           | .30                       |
| F                           | Lithospermum spp.         | 10                         | 5                           | .03                       |
| F                           | Navarretia intertexta (a) | 1                          | 1                           | .00                       |
| Total for Annual Forbs      |                           | 1                          | 1                           | 0.00                      |
| Total for Perennial Forbs   |                           | 23                         | 13                          | 0.34                      |
| Total for Forbs             |                           | 24                         | 14                          | 0.34                      |

## BROWSE TRENDS --

Herd unit 29 , Study no: 3

| T<br>y<br>p<br>e | Species                              | Strip<br>Frequency<br>'98 | Average<br>Cover %<br>'98 |
|------------------|--------------------------------------|---------------------------|---------------------------|
| B                | Amelanchier utahensis                | 15                        | 2.34                      |
| B                | Artemisia nova                       | 5                         | .30                       |
| B                | Artemisia tridentata<br>wyomingensis | 59                        | 13.00                     |
| B                | Chrysothamnus viscidiflorus          | 0                         | .00                       |
| B                | Gutierrezia sarothrae                | 0                         | -                         |
| B                | Juniperus osteosperma                | 0                         | -                         |
| B                | Opuntia spp.                         | 2                         | -                         |
| B                | Purshia tridentata                   | 1                         | -                         |
| B                | Quercus gambelii                     | 6                         | 2.19                      |
| Total for Browse |                                      | 88                        | 17.84                     |

# BASIC COVER --

Herd unit 29 , Study no: 3

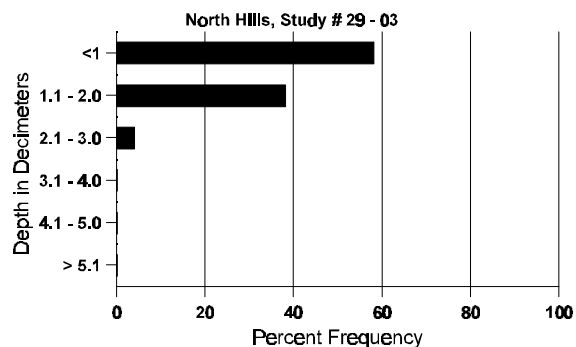
| Cover Type  | Nested Frequency '98 | Average Cover % '98 |
|-------------|----------------------|---------------------|
| Vegetation  | 361                  | 39.57               |
| Rock        | 195                  | 6.71                |
| Pavement    | 267                  | 12.20               |
| Litter      | 459                  | 51.77               |
| Cryptogams  | 20                   | .41                 |
| Bare Ground | 307                  | 21.43               |

# SOIL ANALYSIS DATA --

Herd Unit 29, Study # 03, Study Name: North Hills

| Effective rooting depth (inches) | Temp °F (depth) | pH  | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|----------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 9.9                              | 77.8 (11.6)     | 6.8 | 70.0  | 14.2  | 15.8  | 3.1 | 9.4   | 16.0  | .5   |

# Stoniness Index



# PELLET GROUP FREQUENCY --

Herd unit 29 , Study no: 3

| Type   | Quadrat Frequency '98 |
|--------|-----------------------|
| Rabbit | 28                    |
| Elk    | 5                     |
| Deer   | 58                    |
| Cattle | 1                     |

## BROWSE CHARACTERISTICS --

Herd unit 29 , Study no: 3

| A<br>Y<br>G<br>R<br>E                          | Form Class (No. of Plants) | Vigor Class                |    |    |                         |   |   |                          |   |   | Plants<br>Per Acre | Average<br>(inches)<br>Ht. Cr. | Total |     |      |    |    |    |
|--|----------------------------|----------------------------|----|----|-------------------------|---|---|--------------------------|---|---|--------------------|--------------------------------|-------|-----|------|----|----|----|
|  |                            | 1                          | 2  | 3  | 4                       | 5 | 6 | 7                        | 8 | 9 |                    |                                |       | 1   | 2    | 3  | 4  |    |
| Amelanchier utahensis                          |                            |                            |    |    |                         |   |   |                          |   |   |                    |                                |       |     |      |    |    |    |
| Y  | 98                         | -                          | 1  | -  | 18                      | - | - | -                        | - | - | 19                 | -                              | -     | -   | 380  |    | 19 |    |
| M  | 98                         | 19                         | 7  | 1  | 1                       | 3 | - | -                        | - | - | 31                 | -                              | -     | -   | 620  | 38 | 56 | 31 |
| D  | 98                         | 2                          | -  | -  | -                       | - | - | -                        | - | - | 2                  | -                              | -     | -   | 40   |    | 2  |    |
| % Plants Showing '98                           |                            | <u>Moderate Use</u><br>21% |    |    | <u>Heavy Use</u><br>02% |   |   | <u>Poor Vigor</u><br>00% |   |   | <u>%Change</u>     |                                |       |     |      |    |    |    |
| Total Plants/Acre (excluding Dead & Seedlings) |                            |                            |    |    |                         |   |   |                          |   |   | '98                | 1040                           | Dec:  | 4%  |      |    |    |    |
| Artemisia nova                                 |                            |                            |    |    |                         |   |   |                          |   |   |                    |                                |       |     |      |    |    |    |
| M  | 98                         | 1                          | 4  | -  | -                       | - | - | -                        | - | - | 5                  | -                              | -     | -   | 100  | 13 | 24 | 5  |
| D  | 98                         | -                          | 1  | -  | -                       | - | - | -                        | - | - | 1                  | -                              | -     | -   | 20   |    | 1  |    |
| X  | 98                         | -                          | -  | -  | -                       | - | - | -                        | - | - | -                  | -                              | -     | -   | 20   |    | 1  |    |
| % Plants Showing '98                           |                            | <u>Moderate Use</u><br>83% |    |    | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00% |   |   | <u>%Change</u>     |                                |       |     |      |    |    |    |
| Total Plants/Acre (excluding Dead & Seedlings) |                            |                            |    |    |                         |   |   |                          |   |   | '98                | 120                            | Dec:  | 17% |      |    |    |    |
| Artemisia tridentata wyomingensis              |                            |                            |    |    |                         |   |   |                          |   |   |                    |                                |       |     |      |    |    |    |
| S  | 98                         | 6                          | -  | -  | -                       | - | - | -                        | - | - | 6                  | -                              | -     | -   | 120  |    | 6  |    |
| Y  | 98                         | 3                          | 1  | -  | 1                       | - | - | -                        | - | - | 5                  | -                              | -     | -   | 100  |    | 5  |    |
| M  | 98                         | 20                         | 29 | 10 | -                       | - | - | -                        | - | - | 57                 | -                              | 2     | -   | 1180 | 26 | 37 | 59 |
| D  | 98                         | 4                          | 22 | 3  | -                       | - | - | -                        | - | - | 19                 | -                              | 5     | 5   | 580  |    | 29 |    |
| X  | 98                         | -                          | -  | -  | -                       | - | - | -                        | - | - | -                  | -                              | -     | -   | 500  |    | 25 |    |
| % Plants Showing '98                           |                            | <u>Moderate Use</u><br>56% |    |    | <u>Heavy Use</u><br>14% |   |   | <u>Poor Vigor</u><br>13% |   |   | <u>%Change</u>     |                                |       |     |      |    |    |    |
| Total Plants/Acre (excluding Dead & Seedlings) |                            |                            |    |    |                         |   |   |                          |   |   | '98                | 1860                           | Dec:  | 31% |      |    |    |    |
| Chrysothamnus viscidiflorus                    |                            |                            |    |    |                         |   |   |                          |   |   |                    |                                |       |     |      |    |    |    |
| S  | 98                         | 1                          | -  | -  | -                       | - | - | -                        | - | - | 1                  | -                              | -     | -   | 20   |    | 1  |    |
| % Plants Showing '98                           |                            | <u>Moderate Use</u><br>00% |    |    | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00% |   |   | <u>%Change</u>     |                                |       |     |      |    |    |    |
| Total Plants/Acre (excluding Dead & Seedlings) |                            |                            |    |    |                         |   |   |                          |   |   | '98                | 0                              | Dec:  | -   |      |    |    |    |
| Gutierrezia sarothrae                          |                            |                            |    |    |                         |   |   |                          |   |   |                    |                                |       |     |      |    |    |    |
| M  | 98                         | -                          | -  | -  | -                       | - | - | -                        | - | - | -                  | -                              | -     | -   | 0    | 12 | 9  | 0  |
| % Plants Showing '98                           |                            | <u>Moderate Use</u><br>00% |    |    | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00% |   |   | <u>%Change</u>     |                                |       |     |      |    |    |    |
| Total Plants/Acre (excluding Dead & Seedlings) |                            |                            |    |    |                         |   |   |                          |   |   | '98                | 0                              | Dec:  | -   |      |    |    |    |
| Juniperus osteosperma                          |                            |                            |    |    |                         |   |   |                          |   |   |                    |                                |       |     |      |    |    |    |
| X  | 98                         | -                          | -  | -  | -                       | - | - | -                        | - | - | -                  | -                              | -     | -   | 20   |    | 1  |    |
| % Plants Showing '98                           |                            | <u>Moderate Use</u><br>00% |    |    | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00% |   |   | <u>%Change</u>     |                                |       |     |      |    |    |    |
| Total Plants/Acre (excluding Dead & Seedlings) |                            |                            |    |    |                         |   |   |                          |   |   | '98                | 0                              | Dec:  | -   |      |    |    |    |
| Opuntia spp.                                   |                            |                            |    |    |                         |   |   |                          |   |   |                    |                                |       |     |      |    |    |    |



| A<br>G<br>E | Y<br>R | Form Class (No. of Plants)                     |   |                             |    |   |                         |   |   |                          | Vigor Class |   |                |   | Plants<br>Per Acre | Average<br>(inches)<br>Ht. Cr. |     | Total |     |
|-------------|--------|--|---|-----------------------------|----|---|-------------------------|---|---|--------------------------|-------------|---|----------------|---|--------------------|--------------------------------|-----|-------|-----|
|             |        | 1  | 2 | 3                           | 4  | 5 | 6                       | 7 | 8 | 9                        | 1           | 2 | 3              | 4 |                    |                                |     |       |     |
| M           | 98     | 1  | - | -                           | -  | - | -                       | - | - | -                        | 1           | - | -              | - | 20                 | 5                              | 6   | 1     |     |
| D           | 98     | 1  | - | -                           | -  | - | -                       | - | - | -                        | -           | - | -              | 1 | 20                 |                                |     | 1     |     |
|             |        | % Plants Showing<br>'98                        |   | <u>Moderate Use</u><br>00%  |    |   | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>50% |             |   | <u>%Change</u> |   |                    |                                |     |       |     |
|             |        | Total Plants/Acre (excluding Dead & Seedlings) |   |                             |    |   |                         |   |   |                          |             |   |                |   |                    | '98                            | 40  | Dec:  | 50% |
|             |        | Purshia tridentata                             |   |                             |    |   |                         |   |   |                          |             |   |                |   |                    |                                |     |       |     |
| M           | 98     | -  | 1 | -                           | -  | - | -                       | - | - | -                        | 1           | - | -              | - | 20                 | 39                             | 72  | 1     |     |
|             |        | % Plants Showing<br>'98                        |   | <u>Moderate Use</u><br>100% |    |   | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00% |             |   | <u>%Change</u> |   |                    |                                |     |       |     |
|             |        | Total Plants/Acre (excluding Dead & Seedlings) |   |                             |    |   |                         |   |   |                          |             |   |                |   |                    | '98                            | 20  | Dec:  | -   |
|             |        | Quercus gambelii                               |   |                             |    |   |                         |   |   |                          |             |   |                |   |                    |                                |     |       |     |
| S           | 98     | 3  | - | -                           | -  | - | -                       | - | - | -                        | 3           | - | -              | - | 60                 |                                |     | 3     |     |
| Y           | 98     | -  | - | -                           | 17 | - | -                       | - | - | -                        | 17          | - | -              | - | 340                |                                |     | 17    |     |
| M           | 98     | 14   | - | -                           | -  | - | -                       | - | - | 16                       | 30          | - | -              | - | 600                | 50                             | 28  | 30    |     |
|             |        | % Plants Showing<br>'98                        |   | <u>Moderate Use</u><br>00%  |    |   | <u>Heavy Use</u><br>00% |   |   | <u>Poor Vigor</u><br>00% |             |   | <u>%Change</u> |   |                    |                                |     |       |     |
|             |        | Total Plants/Acre (excluding Dead & Seedlings) |   |                             |    |   |                         |   |   |                          |             |   |                |   |                    | '98                            | 940 | Dec:  | -   |